the ILLINOIS ENGINEER

PROGRAM FOR 72nd ANNUAL MEETING, HOTEL SHERMAN, CHICAGO, APRIL 11, 12 AND 13

MEIGS AIR FIELD, CHICAGO, ILLINOIS

Department Public Works Photo

THE ILLINOIS ENGINEER, MARCH, 1957—VOLUME XXXIII, NO. 3

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Affiliated with the National Society of Professional Engineers

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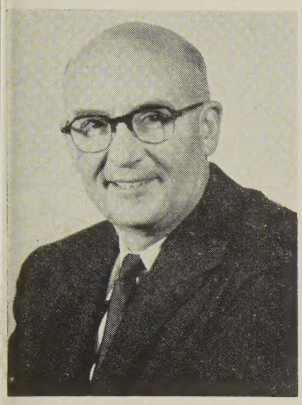
Of Interest to I. S. P. E.

AFTER-THOUGHTS ON ENGINEERS' WEEK

By Royce E. Johnson, *President*

Sincere appreciation and thanks are due the members of Engineers' Week committees who so effectively enlightened non-engineers and at the same time refreshed members of the profession regarding engineering accomplishments and contributions to progress. The modern need for engineers as a minority group to promote public recognition is ample reason for Engineers' Week.



Royce E. Johnson

Further analysis of ramifications and secondary effects leads to the hopeful conclusion that there will be one long term but presently obscure effect which may lead to even more important results. The secondary effect for which we should have high hope is the long range reaction of engineers themselves to the publicity given their high standards of performance and conduct.

Publicity of this nature leads people to expect more from engineers. It also causes thoroughbred professional engineers to more actively strive for higher performance to fulfill expectations generated by the publicity. The cumulative effect of this annual stimulus should lead to greater accomplishments than those of which the profession is now justly proud.

Lest we be proud in a smug way, though, we should realize that some of our technical accomplishments may not be in the best long range interests of our country. For example, high-horsepower, fuel-eating automobiles by the million is an accomplishment difficult to justify in view of the small real need for super acceleration and the increasing industrial and national defense demand we will have for our decreasing supply of hydro-carbons and lead.

Were all engineers imbued with a feeling of stewardship for the world's mineral and fuel resources, which have required two billion or so years to accumulate and which must suffice for our descendants for many generations, we could restrain those who will dissipate much of the fossil fuel and mineral reserves in a century or two for personal pleasure or profit.

In other accomplishments the engineer has, albeit fortuitously in many instances, acquired beneficial control over what was originally purely destructive power or knowledge. Atomic power for industrial use and the radiation from radioactive materials are outstanding examples.

It follows from the preceding line of thought that the engineering profession has a tremendous opportunity to render socially useful services of greater breadth and depth than the engineering services for which the profession is now recognized. Responsibility for influencing technological practices in the best interests of the human race should not be neglected, left to politicians or financiers.

Our professional engineers' societies are the logical engineering societies for developing among professional engineers awareness of the fact that professional men have an interest in and considerable responsibility for the ultimate results of their work whether it be the manufacture of vehicles, appliances and weapons or the construction of private and public projects.

COVER PICTURE

The cover picture is one of Meigs Air Field. Those who remember the Century of Progress in 1933 will remember this as part of Northerly Island. The island has been built much larger in the intervening 24 years. Up in the right corner is Adler Planetarium, in the center toward the top is Shedd Aquarium, and to the left is Soldier's Field and Field Museum. This is an excellent picture of Chicago's front yard. Meigs Field is one of the operations under the direction of the Commissioner of Public Works, George DeMent.

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READ THE ADVERTISEMENTS

SUBSCRIPTION RATES

$2.00 per year in advance to members of the Illinois Society of Professional Engineers. $4.00 per year in advance to non-members in U.S.A. and its possessions, Canada, and Mexico. Foreign $6.00. Single copies 40c.

Published by the Illinois Society of Professional Engineers, Inc., at 614 East Green Street, Champaign, Illinois.

Address all communications to the Illinois Society, P. E. Roberts, Editor, 614 East Green Street, Champaign, Illinois.

The Illinois Society is not responsible for statements made or opinions expressed in this publication.

Entered as Second Class Matter April 27, 1949, at the Post Office, Champaign, Illinois.

VOX SECRETARII

By P. E. Roberts, *Executive Secretary*

Highway Engineering Conference

The 43rd Annual Highway Engineering Conference was held at the University of Illinois on February 26, 27 and 28. A conference was begun by C. "Square" Wiley, a Life Member of the Illinois Society, in 1914. Through the years the conference has grown so that it is now sponsored by the Department of Civil Engineering, University of Illinois, with the Illinois Division of Highways; Illinois Association of County Superintendents of Highways; Public Works Section, Illinois Municipal League; township officials of Illinois, and Midwest Section, Institute of Traffic Engineers in cooperation with the Division of Extension, University of Illinois. The attendance at the Highway Conference is like old home week in the Illinois Society, since so many members of the Society always attend. The seating at the speaker's table at the annual banquet proves the point, since a large majority of those seated there are members of the Illinois Society.

National Engineers' Week

On other pages in this issue you will find pictures of proclamations being signed and several other pictures of events held during the week of February 17 to 23. There are some stories missing; however, delivery of copy was held up to the last minute in order to include all of the stories. The Editor made special pleas to Chapters to deliver their pictures and stories to him in time to include in this issue.

Membership

A year ago a record ballot of 27 applications plus 5 transfers appeared on the February ballot. It is pleasing to record that the ballot sent out on February 26 topped this record. There were 37 applications, 3 reinstatements, 7 transfers in grade and one application for Life Membership. This is by far the largest ballot in the past several years. In this connection, it is gratifying, also, to note that three applications were received on the form printed in the February issue of the *Illinois Engineer*. If you have not already done so, may we remind you again to tear out this page and hand it to a prospective member.

Annual Meeting

As near a complete program as is now available is printed in this issue. In slightly less than a month from the time you receive this issue the members of the Illinois Society will assemble in the Sherman Hotel in the 72nd Annual Meeting of the Society. It is noteworthy that President Johnson has made a special effort to help functional sections organize and begin to operate. Friday morning has been set aside for group meetings of various functional sections. If for no other reason, it will be worth your while to sit in on one of these sessions and do a bit toward furthering professional activity of your engineering society.

Miscellany

As this issue goes to press, the Illini basketball team has been definitely counted out of the championship race, but from all appearances they will end up in the first division. . . . Like engineering and agriculture, basketball is tops at the University of Illinois. . . .

Letter to The Editor

715 West Iowa Street, Urbana, Illinois
February 2, 1957

Dear Mr. Roberts:

Many engineers are acquainted with the work of Mr. Robert Moses as a belligerent servant of the public interests in the construction and maintenance of parks, roadways, and all important public improvements in the region of New York City. In the December issue of *Harpers* Magazine, regarding the Federal system of superhighways, he speaks out a megaphone warning that

"Before we toss our hats in the air and shout Hosanna! we had better take a look at the horrors as well as the advantages which the new system can inflict on us—unless we are suspicious, far-sighted, civic-minded, and unselfish, and unless we promptly tell our legislators and administrators what we want done.

"What are these evils? They lurk in every foot of frontage, every acre of land bordering the new routes. Even the express arteries, with limited access and infrequent entrances will be entirely unprotected by the new federal law against signs and billboards. The entrances, exits, and intersections are all left exposed to an indiscriminate mushroom growth of ugly filling stations, hot-dog stands, and all other familiar roadside eyesores."

As engineers surely we have a special right and responsibility to use our influence to protect our countryside from the blight which threatens this great highway system. Specifically, our local chapters could send their resolutions to our national officials and to our congressmen requesting prompt action.

Respectfully,
W. H. Rayner
Professor of Civil Engineering, Emeritus

Functional Sections Program for Annual Meeting

Response to the Functional Sections Questionnaire submitted to I. S. P. E. members late in 1956 reveals considerable desire for such sections. Specific reasons for organizing functional sections are to be inferred from the good response to the questionnaires. Many indicated interest in two or more functions even though the questionnaire did not provide for this. This enthusiasm parallels that observed in the National Society of Professional Engineers and in Ohio and several other states. Consequently, it is planned to organize func-

ional sections at our forthcoming annual meeting.

The Friday morning session, as noted in the program, will begin with a general meeting to hear talks or panel discussion to supply pertinent information and suggestions. Qualified speakers are currently being arranged for. Discussion from the floor will also be in order.

Following this general session, those interested in functional groups will gather in assigned conference rooms or areas of the main meeting room for the purpose of organizing and going into action. A temporary chairman will initiate the proceedings for each section.

Suggestions for organization procedure will be provided the temporary chairmen in advance of the meeting to reduce confusion and uncertainty. For this purpose the Functional Sections Committee, Lawrence J. Keeman, chairman, has prepared material which has been approved by the Constitutional Amendments Committee, J. H. Morgan, chairman.

Functional sections as enumerated below are planned:

Functional Section	*Number Interested*	
Engineers in Private Practice	209	
Education and Student—Lawrence E. Doyle*	34	
Engineers in Industry—Royce E. Johnson*	185	
Highway Engineers	112	
Municipal and Sanitary,	98	117
Government, State and County	19	
Public Utilities	54	
Surveyors—Arnold A. Lundgren*	31	

* Organizing chairmen—vacancies are being filled.

The following statement of general activities, problems and challenges which confront engineers in the various fields of employment will, it is hoped, assist in formulating specific programs in the sections:

1. Promote activities for I. S. P. E. and N. S. P. E. which will be beneficial to the profession, to those in the functional field concerned or to the public.
2. Evaluate and formulate reasons why engineers in their respective functional fields should be
   a. Registered Professional Engineers
   b. Members of I. S. P. E.
3. Encourage or sponsor short courses, institutes, night classes, conferences, etc., for engineers and engineering assistants.
4. Recommend improvements in statements of ethics and policies for their respective functional fields, for approval or adoption by I. S. P. E. and N. S. P. E.
5. Recommend to the Legislative Committee changes and improvements in state and national laws.
6. Assist other committees, such as Fees and Salaries, Ethics and Practice, Chapter Activities, State Engineering Employees, State Building Code, Membership, Professional Education, Public Relations and Publicity, by supplying pertinent information and suggestions.
7. Recommend to incoming presidents members of functional sections for appointment to state committees.
8. Devise means for assisting young engineers in their professional development.

As experience is gained in the section meetings and committees and discussions are held, additional ideas, both general and definite, will occur. It appears very probable that functional section activities can do much to provide tangible benefits to our members.

Obituary

G. Lorenze Miller (N '57), a member of Central Illinois Chapter, died suddenly in Decatur on January 11.

Mr. Miller was born in Buffalo, New York, in 1890 and, due to serious and protracted illness in his boyhood, received most of his education through private instruction and tutors. From 1918 through 1942 he was in lamp and fixture design with Faries Manufacturing Company in Decatur. From 1942 to 1945 he was with Caterpillar Military Engines in tool and equipment design, and in 1945 he opened his own office as a design engineer and a registered patent attorney.

Mr. Miller was active in the Masonic Lodge. He was a member of both Illinois Society and National Society of Professional Engineers, American Association of Engineers, American Society of Tool Engineers, and the American Society of Military Engineers.

RESOLUTION

In Memory of G. Lorenze Miller

WHEREAS, The Central Illinois Chapter of the Illinois Society of Professional Engineers has suffered a very great loss in the death of one of its most able members, Mr. G. Lorenze Miller, on January 11, 1957, and

WHEREAS, he was an active member of this Chapter and a well-known and respected citizen in Decatur and Central Illinois, and

WHEREAS, he contributed greatly to the technical advance of the Engineering Profession by his abilities and long service as a Patent Attorney, and

WHEREAS, he upheld the very highest professional ideals of the Engineering Profession by his integrity and by his leadership in civic affairs and community service;

THEREFORE, BE IT RESOLVED, that the Central Illinois Chapter of the Illinois Society of Professional Engineers place this Resolution on its records in grateful acknowledgment of the contribution made by G. Lorenze Miller to this Society and the engineering profession, and in recognition of the distinct loss to the Society and its Members, and

BE IT FURTHER RESOLVED, that a copy of this Resolution be sent to the family of Mr. Miller, and also a copy to the State Office of the Society.

J. Parke Boyer, *President*

Program Illinois Society of Professional Engineers 72nd Annual Meeting

APRIL 11, 12, 13, HOTEL SHERMAN, CHICAGO, ILLINOIS

WEDNESDAY, APRIL 10

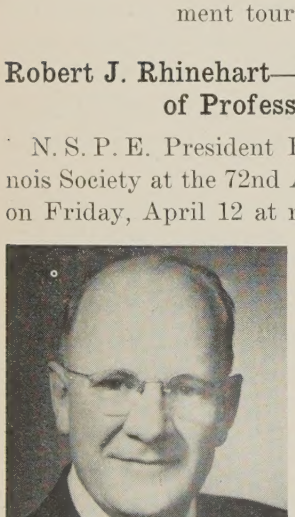
7:00 p.m. Registration and Welcome

THURSDAY, APRIL 11

8:00 a.m. Registration and Welcome
8:30 a.m. Meeting of the Board of Direction
8:30 a.m. Opening of Exhibits
9:00 a.m. Registration Law Symposium — President Royce Johnson. "What is the Registration Law and how can it be improved?" Talk, discussion groups, conclusions of leaders.
12:00 to 2:00 p.m. Luncheon—Presiding, Royce E. Johnson. Welcome, Invocation, Introductions, Speaker
2:00 p.m. Meeting of the Board of Direction
2:00 p.m. Fees and Salaries Symposium Review development of Fees and Salaries Schedule as adopted last Summer. Talk, discussion groups, conclusions of leaders.
5:00 p.m. Adjournment
5:30 to 7:00 p.m. Cocktail Reception Pay-as-you-go entertainment — available tickets for the best shows and entertainment tour.

Robert J. Rhinehart—President, National Society of Professional Engineers

N. S. P. E. President Rhinehart will address the Illinois Society at the 72nd Annual Luncheon of the Society on Friday, April 12 at noon.



Robert J. Rhinehart

Robert J. Rhinehart of Pine Bluff, Arkansas, is division superintendent for the Arkansas Power & Light Company, and has been associated with this firm for 30 years.

Mr. Rhinehart was born in Plymouth, Indiana, where he attended elementary and high school. After serving in the Signal Corps in 1918, he entered Purdue University and was graduated with a B.S. in electrical engineering in 1922. He received an E.E. degree from the same institution in 1926.

(Continued on page 5)

FRIDAY, APRIL 12

8:00 a.m. Registration and Welcome
8:30 a.m. Engineers Functional Group Symposium
Group discussion on:
1. Engineers in Industry
2. Engineers in Private Practice
3. Engineers in Government
4. Engineers in Education

Conclusions of Group leaders
12:00 m. Luncheon—Presiding, Royce E. Johnson Welcome, Invocation, Introductions, Address — Robert J. Rhinehart, President N. S. P. E.
2:00 p.m. 72nd Annual Meeting of the Society
5:00 p.m. Adjournment
5:30 p.m. Sponsored Cocktail Party
6:30 p.m. Banquet—Presiding, Royce E. Johnson Welcome, Introductions, Awards, Address —Dr. Leland H. Carlson, President, Rockford College

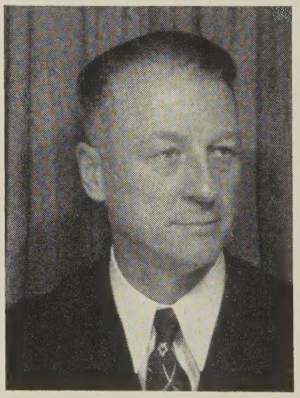
SATURDAY, APRIL 13

8:30 a.m. Meeting of the new Board of Direction

Banquet Speaker

Dr. Leland H. Carlson will address the 72nd Annual Banquet of the Society on Friday, April 12.

Leland H. Carlson was born on March 25, 1908, in Rockford, Illinois. He has a wife, a son and a daughter.



Dr. Leland H. Carson

Dr. Carlson attended Rockford High School, received a Bachelor of Arts degree with honors from Beloit College in 1931, attended North Park Theological Seminary, University of Chicago Federated Theological Seminary, and received his Doctor of Philosophy degree from the University of Chicago in 1939. He has done special work at the University of Grenoble in France and Cambridge University in England.

Dr. Carlson belongs to many learned societies. He has authored four books and numerous articles. The list of his honorary societies is long and impressive. The Society is indeed fortunate to be able to hear Dr. Carlson's message on Friday night.

72nd ANNUAL MEETING PROGRAM

LADIES' ENTERTAINMENT

Ladies Headquarters—Room 111, Sherman Hotel—adjacent to registration area—open all day April 11 and 12.

Thursday, April 11

7:30 a. m. to 9:00 a. m.—Tickets available for Don McNeil's Breakfast Club—Porterhouse Room, Sherman Hotel

9:00 a. m. to 11:00 a. m.—Social Hour (Room 111) Coffee served.

Optional Activities (time to be announced later)

1) Tour of Merchandise Mart
2) Tour of new Prudential Building
3) Visit to Lincoln Park Conservatory —Preview of Easter Flower Show (formal opening April 14)

Friday, April 12

7:30 a. m. to 9:00 a. m.—Tickets available for Don McNeil's Breakfast Club—Porterhouse Room, Sherman Hotel

9:00 a. m. to 10:00 a. m.—Social Hour (Room 111) Coffee served.

10:00 a. m. to 4:00 p. m.—Bus trip to "Old Orchard" (Marshall Field's new store) — Luncheon in the Arcade Room. Tour of new shopping center.

LADIES' CHAIRMAN

Mrs. Virgil E. Gunlock is chairman of the women's activity in connection with the 72nd Annual Meeting. She and Past President Gunny are parents of two teenage children. Mrs. G is particularly active in the spring and fall rummage sales of the church, having served as chairman during the past four years. They both like hunting and hunting dogs. Field trials with pointers and setters are looked forward to eagerly by both Mr. and Mrs. Gunlock. They and the two children go western on horseback when they watch the dogs work. For indoor pastime Mrs. G confesses that she likes card games, especially the five-card variety. She and her capable committee are looking forward to entertaining many of the ladies of the Illinois Society on Thursday and Friday.

Mrs. Virgil E. Gunlock

One and all agree the world is in a state of ferment, but not one can tell whether the result will be champagne or vinegar.—*Grit.*

ATTENTION LADIES!!!

Leave your kids with "granny" and grab your hat,
You'll be most welcome at the Sherman—
you can count on that.
On April 11th and 12th we are planning
some good fun,
So please come, relax and enjoy it, by gum!
We hope our entertainment will please you
the "mostest,"
Come to room "one eleven" and see what is posted.
We will meet you, greet you— escort you
around town;
We're looking forward to seeing you—
don't let us down.

Ladies Activities Committee

Robert J. Rhinehart—Continued

A member of the Arkansas S. P. E. and N. S. P. E. for many years, Mr. Rhinehart was elected as a director of the National Society in 1950, and served in that capacity until he was elected as an N. S. P. E. vice president for the Southwestern area in 1954.

He was appointed to the Arkansas State Board of Engineering Registration in 1948, and reappointed for a second term in 1952. He has served as president of the Board for three years of that time.

In addition to his engineering activities, Mr. Rhinehart has participated extensively in civic affairs. He is a charter member of his Kiwanis Club, with a perfect attendance record of 25 years, and was president of the club in 1931 and 1932. He has also served as governor of the Missouri-Kansas-Arkansas District of Kiwanis International. He was presented the Legion of Honor Award by Kiwanis International early in 1956.

Mr. Rhinehart is a Presbyterial elder, a Sunday school teacher, and a lay minister. He has served as chairman of the Pine Bluff Park Commission for 12 years, and of the Pine Bluff Planning Commission for five years. He organized the Pine Bluff Community Chest and Council, and is a member of the Sahara Shrine Temple, American Legion, Last Man's Club, and the Chamber of Commerce.

His other civic and community work includes the presidency of the Arkansas Society of Crippled Children, terms of service as a Cub Scout den father, Boy Scout committeeman, and a Sea Scout commodore, and the chairmanship of a Girl Scout camp construction committee. In 1939 he was selected as "Our Leading Citizen" by the people of Pine Bluff.

Mr. Rhinehart married his childhood sweetheart, Margaret Louise Cressner, in 1926. They have one son. Their home is at 3500 Cherry Street, Pine Bluff.

PROFESSIONAL DIRECTORY

High Temperature Hot Water (HTHW) for University Expansion

By J. Raymond Carroll, P.E.
Associate Professor Mechanical Engineering
University of Illinois

Introduction

The interest that is presently being exhibited by many University administrators in the subject of HTHW for district heating is primarily a result of the tremendous expansion programs required in order to meet the expected demands for increased facilities within the next ten years. Industry, in general, is also faced with the same problems and questions concerning the requirements for future expansion; whether the problems are related to a future addition to existing facilities or to the creation of an entirely new facility in a new location. It is recognized that the major installations of HTHW to date have been in military bases. However, the expected expansion of University facilities (and in many cases industrial facilities) is very similar to the expansion of military bases in that a mixture of different types of buildings is usually required. Many buildings are for living quarters; some are for office or classroom work; and some are for laboratory or process purposes. The basic question as to whether or not to convert to HTHW for district heating centers around the versatility of this medium as compared to steam in meeting the varied requirements of the various buildings.

In reviewing the literature on this subject, and in personal discussions with those engineers who have done design work in this area, I have been frankly surprised at the one-sided viewpoint expressed. This is not unnatural in engineering circles but, considering the relatively small number of installations and the small amount of factual operating data published for installations in this country, it is somewhat startling to find such broad and positive claims as are presented. I have been casually interested in this subject for about 6 years and only became indirectly involved within the last 5 years in the system installed at the Great Lakes Naval Station which was designed initially for heating a series of warehouses. I do not, therefore, claim to be an expert in the sense that I have experienced the trials of design nor the tribulations of operation. Rather, I am an interested observer who has read extensively about the subject and who said "yes" instead of "no" in a weak moment when requested to prepare this paper.

In any case, the following is an attempt to objectively present the subject of HTHW and to compare the design and operating characteristics with the more widely accepted conventional steam distribution system.

I wish to acknowledge the invaluable aid of Mr. Gordon V. Carlson, Superintendent of Utilities, Physical Plant Department, University of Illinois, for his assistance in supplying factual operating data on the University steam system; and to Lt. R. W. Trompeter, Public Works Officer, and Mr. Chester, Great Lakes Naval Supply Depot, for their courtesy in supplying data on the operation of the system previously mentioned. Especial acknowledgment is also due to Mr. D. N. Crosthwait, Technical Adviser, C. A. Dunham Company, for his permission to draw freely upon the ideas and expressions contained in Manual 2685 of the C. A. Dunham Company.

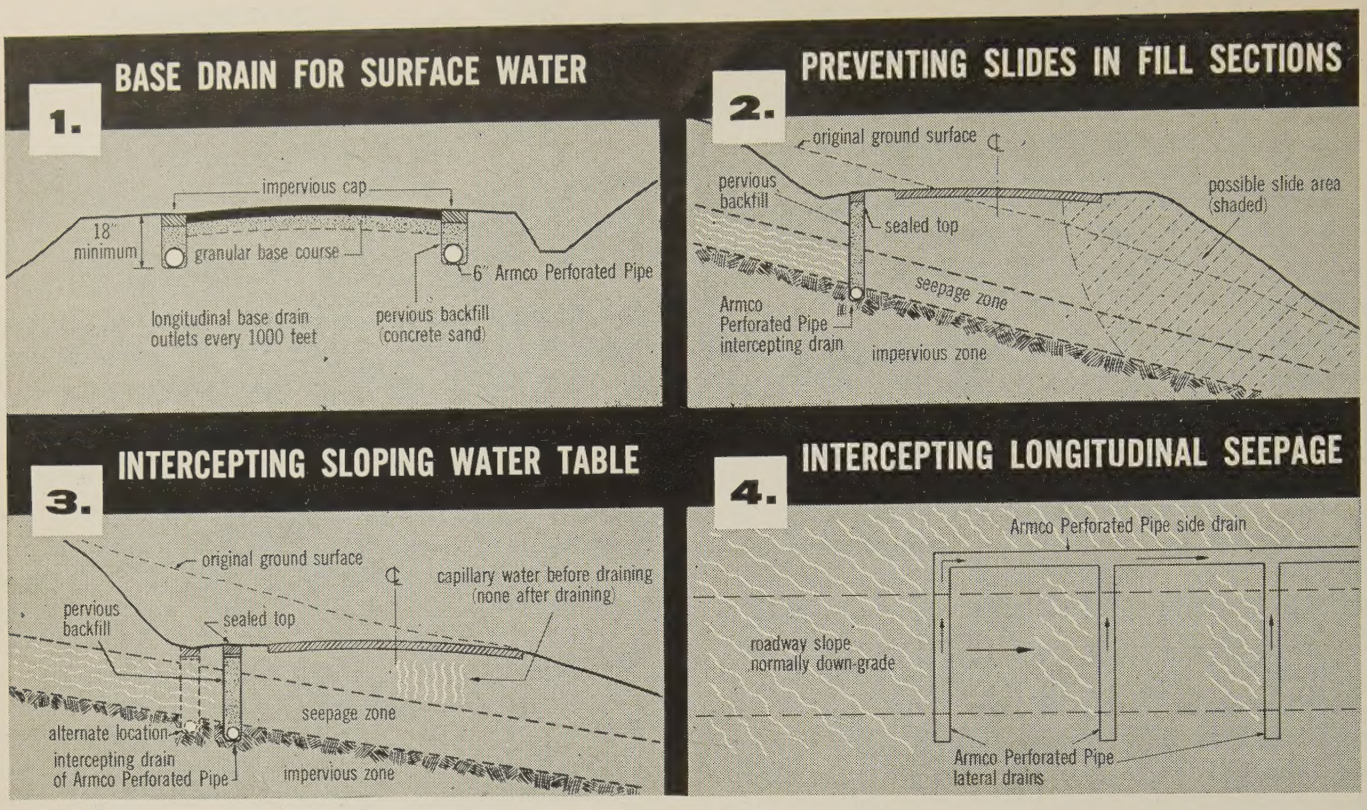
History

High temperature hot water is not necessarily a recent invention but, rather, it is a modern application of fundamental well-known principles made possible by long-term economic improvements in heat transfer apparatus and piping and in direct drive electric pumps. It has been used more in Europe than in this country, probably due to the fact that fuel wastage has been more important in the design thinking of European engineers than to their American counterpart. It could also be that there are more district heating systems in Europe than in this country.

The literature relates that a patent was issued in 1831 to a British inventor, Angier March Perkins, pertaining to the gravity flow of high temperature water through a closed continuous circuit of small piping to various heating coils in various rooms within a building (1). The temperature created was approximately 350 to 550 F which, for a direct radiation heating system, was obviously high. However, the system was apparently used in a good many large buildings. Following this, low temperature gravity systems using larger piping became the accepted practice for heating systems within buildings. The use of HTHW was revived in Europe about 1920, primarily for industrial building heating. In the 1930's, HTHW systems began to be applied in this country for district heating purposes as well as industrial building heating and the literature begins to record such installations about 1935. This increased interest largely resulted from the general industrial expansion of that time.

General Usage

HTHW may be used directly to transmit heat to cooking, drying, processing, and other industrial uses and in forced-air heating systems of the unit heater or blast coil type. Except for fan-coil systems, however, most space heating systems must convert to a lower temperature fluid such as low pressure steam or low temperature hot water (180-220 F) since our present day concepts of



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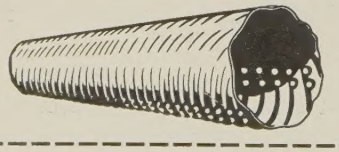

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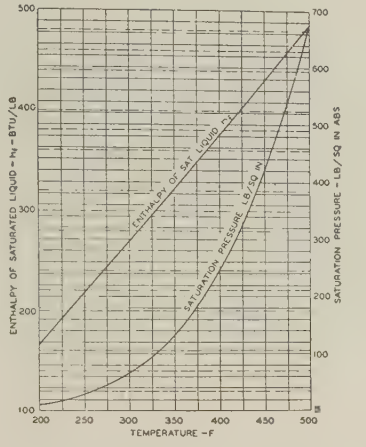
cceptable environments for human comfort do not gen-rally allow high temperature radiation or air systems within buildings where human comfort is of paramount mportance.

Water Temperatures

Figure 1 illustrates the change in saturation pressure orresponding to a change in supply water temperature 2). It should be noted that the pressure increases more apidly with an increase in temperature at the higher emperature level than at the lower temperature level. n other words, water temperatures of approximately 320 to 350 F can be used with standard 125 to 150 psig



Relation of Saturation Pressure and Enthalpy to Water Temperature

piping equipment. The water temperature may be increased to approximately 420 F with an increase to 300 psig piping equipment. The next jump to 600 psig piping equipment only allows an increase to approximately 480 F supply water temperature.

An obvious advantage of using 320 to 350 F (125 psig) hot water is that relatively low cost and readily available commercial equipment can be used; such as valves, fittings, unit heaters, blast coils, convectors, radiant panels, finned pipe, domestic water heaters, and most processing equipment. The temperature drop across the system is usually between 75 and 100 F. The average temperature at the heat transfer equipment is usually 250 to 300 F. By using these temperature drops, less water is circulated than in a conventional low temperature system of 180-220 F and the pipe sizes can be correspondingly smaller. Pipe sizes can be further reduced by increasing the pressure and thereby increasing the supply water temperature to approximately 420 F and by using a 150 to 200 F temperature drop across the system. The smaller pipe sizes resulting more than offset the increased heat loss effect of the higher temperature in large area distribution systems. The temperature drop should not be so great, however, that the economy of smaller pipe sizes is offset by larger equipment due to a lower mean temperature.

Process Heating

Another reason for using the higher temperature hot water instead of medium temperature hot water is that medium or high pressure steam or hot water may be locally required for a specific process as in an industrial application. With 400 to 420 F supply water, 100 to 125 psig steam can be generated at any specific point in the system. The local steam piping can therefore be very short and readily accessible for maintenance. Apparently, however, many processes previously designed exclusively for steam are now being directly served with high temperature hot water.

It is very difficult to generalize concerning the selection of a temperature and pressure for design purposes. Every system design is different. If process heating is directly served from the system, the return temperature is faily well determined and only the temperature difference remains to be selected. If a 100 F temperature difference happens to require a pressure above 125 psig, for instance, it might be more economical to reduce the supply temperature and circulate more water but with less expensive piping and fittings. There is no point in economizing on heating equipment by using high temperatures if the higher pressure requires more expensive piping, fittings, and boilers. On the other hand, high boiler temperatures (350 to 420 F) and large temperature differences (150 to 200 F) allow smaller water quantities and smaller pipe sizes for the same heat carrying capacity, and this may be critical to a system design having very long piping runs.

Water Pressure

There are several methods of maintaining the necessary pressure head including: (a) an elevated tank, (b) steam in an expansion drum, (c) air under pressure, (d) nitrogen or other inert gas, and (e) an automatic feed water pump. Air is obviously not practical because it is easily absorbed at high temperatures and is highly corrosive. Nitrogen is usable, being inert, but somewhat expensive. An elevated tank requires considerable height and also introduces some air to the system. However, this later method may be quite practical in certain instances; particularly if a small elevated tank can replace a large tank where space is at a premium. The most usual method of developing and maintaining pressure on the system is with steam in an expansion tank.

Boiler

Most any of the conventional steam or hot water boiler designs may be used for HTHW in small sizes. However, the water tube boiler is to be preferred in large systems due to the higher efficiencies possible.

The use of low pressure-drop water tube boilers designed especially for HTHW is indicated to keep the pumping costs as low as possible. Since the pumps must operate continuously, 24 hours daily, the horsepower required by the pumps is of great interest. If the boiler has a high pressure drop the additional horsepower must be added to the system circulating pumps or separate boiler circulating pumps must be used.

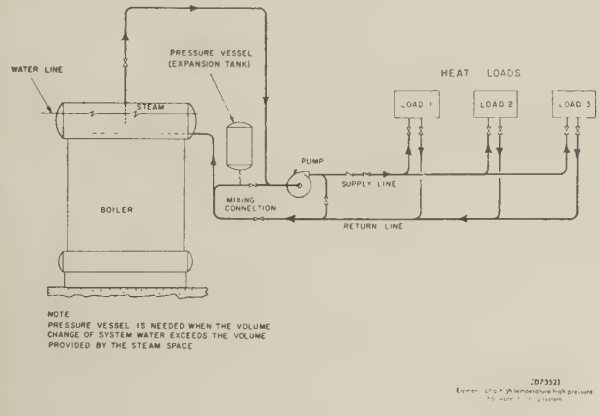
Expansion Tank

Due to insufficient expansion volume within most boilers when used in large systems, it is desirable to use an independent expansion tank in most cases. In this way, all of the expansion and contraction can be contained, and the feed water makeup will be negligible.

The volume of the system is increased about 10 to 12 per cent upon initial heat-up but most of this expansion can be eliminated through the blow-down valve, if necessary. After reaching the design pressure and temperature, the only expansion and contraction is that due to daily variations in temperature. This is about one-fourth of the initial expansion volume. The expansion tank must be constructed for full boiler pressure, be fitted with safety valves, relief valves, high and low water level controls and alarms, and with an extra long gage glass to follow the full expansion and contraction that occurs. This requires that the tank be of significant proportions and weight and of considerable expense to build and to maintain.

Pump

The system circulating pump should be placed in the supply main rather than in the return main (see Figure 2) in order to reduce the concentration of air in the



boiler and to maintain all parts of the system above the boiler pressure (3). This is done for the obvious reason that the water in the system would flash to steam if the pressure in the piping was decreased below the saturation pressure corresponding to the boiler water temperature. Of course, there is a short section between the boiler and the pump suction where this condition could occur with resultant shock, cavitation, and noise. However, this is normally overcome by (1) placing the pump at the lowest level below the boiler outlet so as to increase the static pressure, and (2) by injecting cooler return water into the flow from the boiler before entering the pump so as to lower the water temperature below its saturation temperature. By injecting the cooler return water into the supply line it is also possible to vary the supply water temperature as a function of the weather in order to reduce distribution line losses and to gain better temperature control in the buildings. This may be manual or automatic. Of course, if a fixed temperature process load is on the line this potential economy will not be possible.

The circulating pumps must be designed for the high temperature involved, for the high pressure involved, and for continuous duty. The quantity of water circulated and the pumping head must be carefully pre-determined in order to properly and effectively select the driving motor. The density variation between high and low water temperatures must be considered in the motor selection. On long lines or where a fixed process load determines the return water temperatures, it may be possible to account for the change in density between supply and return temperature in sizing the return line. With space heating alone this is not practical due to the possible variations in temperature. At least one extra pump should always be available as a standby in case of emergency in any of the various circuits.

The circulation pump is the heart of the system and therefore requires special consideration. Pumps are now available that have the following special features:

a) The suction intake is shaped to avoid abrupt changes of direction or velocity so as to reduce the effects of sudden pressure reductions and cavitation.
b) The casing is of cast steel or bronze to withstand the higher pressures and possible shocks.
c) The gland and bearings are water cooled and designed for high temperature.
d) The bedplate and mountings are designed to permit expansion due to large temperature changes without causing misalignment.

Pumps are usually installed in duplicate, each of full capacity, or in triplicate where each pump is sized for 50 per cent full load. If steam is readily available a turbine pump is included for emergency use.

Piping

The piping should be seamless solid drawn steel tubing with welded joints. All valves should have stainless steel trim and cast steel bodies. The piping should be generally graded approximately ½ in. in 10 ft. to an air collecting point and a dirt pocket should be located at each low point. Hot water has a basic advantage over steam in that the supply and return piping do not have to be as carefully graded and traps and vents and dirt pockets do not have to be located at each piece of equipment.

HTHW piping must be well insulated for good control and to reduce heat losses. Compared to high pressure steam systems that lose heat mainly from the supply piping, an equivalent high temperature hot water system has the same size supply and return piping and, in many cases, higher return temperatures. It may, therefore, have a heat loss from piping considerably greater than that for steam. Adequate insulation for both systems does, of course, give less differences between them.

Thermal Storage

One of the most important advantages of a HTHW

system is the large quantity of heat that can be stored within the system. A cubic foot of HTHW at the temperatures referred to will contain about 40 to 50 times as much heat as a cubic foot of steam at the same temperature. If this fact can be utilized to reduce the peak load on the boiler, substantial economies can be achieved.

Large storage tanks called accumulators can be installed to supplement the heat storage of a piping system. The capacity of the boilers may be used at night or during off-peak periods to store hot water for use during the following day or during a period of peak load. The London Pimlico system is one of this nature (4). Hot water is pumped under the Thames River to a housing development on the other side. An accumulator of 400 million Btu capacity stores the heat for distribution as required. The accumulator can be located at any convenient position with respect to the load.

Due to the high thermal storage capacity of a hot water system, fluctuating and peak load conditions can be handled with approximately a 15 to 20 per cent smaller boiler than for a comparable steam system. This reduction in boiler size also reflects itself somewhat in the size and cost of the boiler house. Since a high temperature hot water installation has only minor water losses, the cost of boiler water makeup and water treatment equipment is practically negligible. This also reflects itself somewhat in the space requirements. The largest single cost reduction item, however, is the potential reduction in the distribution lines. This is due to smaller pipe sizes and to the elimination of drip traps and accessories normally required on a steam line. Also, since the piping can follow the contour of the ground, substantially less excavation is involved in hilly or rough terrain.

Make-Up

One interesting difference between a steam system and a HTHW system is that the steam system often has a large make-up water load due to flashing losses, leakage, and improper operation of traps and pressure reducing valves. These reflect themselves in the oversizing of the boiler and the installation of make-up water softening, purifying, and conditioning equipment. Of course, there are as many different degrees of losses as there are steam systems in existence. Many of the better maintained and designed steam systems experience a loss of about 2 to 3 per cent of the total steam circulated; others may experience as much as 10 to 20 per cent. In comparison, a HTHW system may have a make-up load of only 0.1 per cent and, therefore, would not require any water treatment equipment. In others, only a minimum amount of equipment and a negligible cost for make-up water need be considered. Less make-up water usually results in economies from a reduced water bill, reduced cost of heating and treating the feedwater, less scale in boilers, less frequent blowdowns, increased boiler efficiencies, and less boiler cleaning.

In order to allow a comparison with an actual existing district steam system, the make-up water at the University of Illinois was analyzed from the representative data included in Table 1. From these data it should be noticed that the process steam loss is estimated to be a major part of the total make-up requirement. This is a condition peculiar to laboratory and research work since a large part of the process steam is directly used in autoclaves, distilling, soil sterilization and other processes in which it cannot be returned as condensate. It should also be noted that the make-up water quantity only amounts to about 2 to 4 per cent of the total steam supplied after correcting for the process steam loss.

Assuming that the cost of make-up water is 8.2 cents per thousand pounds of water (see Table 2) and using an average of 87,000 pounds of make-up water per average winter day (this is adjusted for process loss), the cost of supplying the water would be $7.14 per day. Assuming that the total cost of delivering steam is 70 cents per 1000 pounds, and using 88,000 pounds of steam per

TABLE 1

REPRESENTATIVE STEAM AND MAKE-UP WATER DATA UNIVERSITY OF ILLINOIS STEAM SYSTEM

Date	OUTDOOR AIR Temp.—F			STEAM DELIVERED—1,000 LBS. PER DAY				MAKE-UP WATER—1,000 LBS. PER DAY			
	Min.	Max.	Ave.	L.P. to Heat	H.P. to Heat and Process	* Process is 50% of H.P.	Total Delivered	Total	% Based on Total Steam	% Corrected for Process Loss	Steam to Heat Make-up
12-19-55	7	18	13	3,582	215	108	3,797	176	4.6	1.8	69
1- 8-56	16	30	23	2,601	186	93	2,787	189	6.8	3.4	96
1-22-56	11	20	16	2,920	180	90	3,100	162	5.2	2.3	72
1-28-56	15	28	22	2,826	207	104	3,033	188	6.2	2.8	85
1-31-56	5	26	16	3,103	214	107	3,317	198	6.0	2.7	91
2- 3-56	14	28	21	2,748	216	108	2,964	232	7.8	4.2	124
2-21-56	21	29	25	2,670	233	117	2,903	193	6.6	2.6	77
						Ave. 104		Ave. 191			Ave. 88
7-22-55	74	90	82	438	223	112	661	126	19.0	2.1	14
7-27-55	76	94	86	430	218	109	648	122	18.8	2.9	19
7-31-55	74	92	83	328	182	91	510	115	22.6	4.4	22
						Ave. 104		Ave. 121			Ave. 18

* Estimated

TABLE 2

ESTIMATE OF COST OF MAKE-UP WATER FOR UNIVERSITY OF ILLINOIS STEAM SYSTEM

1. Sulfuric Acid at 2.86 cents per 1,000 pounds and supplied at a rate of 0.8 pound per 1,000 pounds of water make-up: equals 2.29 cents per 1,000 pounds of water.
2. Caustic Soda at 6.5 cents per 1,000 pounds and supplied at a rate of 0.24 pound per 1,000 pounds of water make-up: equals 1.56 cents per 1,000 pounds of water.
3. Water: equals 2.18 cents per 1,000 pounds of water.
4. Labor at 2 hours per day: equals 2.17 cents per 1,000 pounds of water.
5. Total: equals 8.2 cents per 1,000 pounds of water.

average winter day, the cost for heating the make-up water to boiler temperature is $61.60 per day. This is a total cost of $68.74 per average winter day to supply make-up water without including the cost or depreciation of equipment. A similar calculation for an average summer day (after adjusting for process loss) gives a total cost of $12.60 per day. This would indicate a yearly cost for make-up water of approximately $15,000. Table 3 indicates the extent and size of the present University system.

TABLE 3

SIZE INFORMATION ON UNIVERSITY OF ILLINOIS STEAM HEATING SYSTEM

Approximately 200,000,000 Btu per hour peak heating demand.

Main Piping System in Tunnels (approximate)

Supply:	14 in.	2,400 ft.	
	12 in.	10,000 ft.	
	10 in.	3,000 ft.	
	8 in.	12,300 ft.	
Total			27,700 ft.
Condensate Return:	6 in.	3,700 ft.	
	4 in.	15,000 ft.	
Total			18,700 ft.
Branch Piping System in various underground conduit: (approx.)			28,000 ft.
Total of All Piping (approx.)			74,400 ft.

90 separate buildings are heated from the central plant, amounting to approximately 79,670,000 cu. ft. volume.

Operating Costs

There has been very little information printed in the literature pertaining to either installation or operational costs on HTHW systems.

One of the few recorded installations for which operating cost comparisons is possible was that system installed in 1937 for heating molds in the General Electric Co. reconstructed plastics plant at Pittsfield, Massachusetts (5). The completely new HTHW system indicated a fuel saving of approximately 40 per cent during the winter of 1937-38 over the older method of heating the molds with steam. The new system involved completely new piping for 324 hydraulic presses and included two new oil-fired boilers. The engineering department's estimate of the breakdown of fuel savings is as follows:

1. No loss due to flashing of high pressure condensate to low pressure steam.....17.5%
2. Closed system without leaks or bleeding..... 3.0%
3. No traps or orifices blowing through, no by-passes around the traps.....12.0%
4. Complete insulation on both feed and return lines 5.0%
5. No overflow or flashing of water to steam in hot well or feedwater heater..... 2.0%

Total.....39.5%

Of course, it is not known what fuel savings would have resulted if a new high pressure steam system was installed under the same conditions of design and installation. And, apparently, the old system must have been in a poor state of repair since all piping was completely replaced and new boilers were installed.

This system has a supply temperature of approximately 380 F and a return temperature only 10 to 12 F less. The supply and return mains are 8½ in. and are covered with 2 in. thick, 85 per cent magnesia. The design is intended to handle 10,000,000 Btu per hour. The boilers operate at 200 psig and are a standard industrial type of fire tube boiler with a higher than usual water level. There are two 500,000 lbs. per hour each circulating pumps operating at 230 psig and each driven by a 40 h.p. motor. Only one is in operation at any one time while the other acts as a standby.

HTHW Experience

One of the early district heating installations of a HTHW system in this country was made near New Brunswick, New Jersey, at the Personal Products Company of Milltown and was put into operation in 1941. The boiler room floor is the low point of the system and the high point of the system at the far end is about 79 ft. above the boiler room floor. It is about 5,100 ft. to the end of the longest main. The boilers are of the conventional three-drum water tube steaming type with a boiler water line about 22 ft. above the floor. Therefore, the static head at the water line is about 57 ft. of water. The mains slope up steadily from the boiler room and, therefore, require no venting except at the high point at the far end of the main. Normally, the boilers operate at 185 psig pressure as measured in the steam space. This means a steam temperature of 382 F, with the water drawn off below the water line.

The distribution system consists of an 8 in. supply and return circuit to one building and a separate 10 in. circuit to another group of buildings. The 10 in. circuit has three 600 g.p.m. circulating pumps which are driven by three 40 h.p. motors, designed for 300 psig at 150 ft. pumping head. The 8 in. circuit has four pumps rated at 400 g.p.m. with 30 h.p. motors designed to operate at 120 ft. head. The pumps have water cooled multiple

ring packing glands and pump bearings and have experienced no difficulties and seldom require repacking.

Experience has indicated that globe valves with tapered valves and seats gave superior performance to gate valves. All valves are cast steel with nickel alloy or stainless steel valves and seats.

In this plant, in some cases, HTHW is used for direct process work and in other cases it is used to generate 40 psig steam through convertors. It is used directly in the central fan heating coils at full pressure and with a temperature drop of 160 F. The office area is supplied with 225 F water from a convertor. The maximum required output for both heating and process is about 67,000,000 Btu per hour.

The make-up required is about 150 to 180 gallons per day. Scaling and corrosion in the boiler or piping are not prevalent and, as a result, there is little need for blowing down the boilers or for tube cleaning. At Personal Products there has been no scale difficulties in 15 years of operation. Records kept by Johnson and Johnson indicate that when overall costs are considered, including distribution and utilization, the HTHW system at Personal Products operates at a cost of about 13 per cent lower than other plants operated by Johnson and Johnson.

Great Lakes System

The system installed at the Naval Supply Depot, Great Lakes, Illinois, consists of two forced circulation LaMont type water tube boilers and a common expansion drum (7). The steam pressure in the expansion drum is maintained by automatically varying the rate of firing. There are two pneumatic coal fired boilers equipped with standby oil firing. The boilers are of 250 psig design with 300 psig maximum working pressure and 175 psig minimum working pressure. They were tested to 375 psig. The piping was tested to 500 psig. The boiler efficiency at the peak firing rate of 20,700,000 Btu per hour each is 77 per cent; this is increased to 81 per cent if the capacity is reduced to 10,000,000 Btu per hour.

There is a single expansion drum 6 ft. in diameter and 36 ft. long. The make-up pump operates at approximately 4 ft. from the bottom of the tank, and the blow-off opens at approximately 10 or 12 in. higher. The make-up pump is rated at 20 g.p.m. at 400 psig and requires 20 h.p. There are two boiler circulating pumps; each rated at 350 g.p.m. at 95 ft. head and 15 h.p. There are two new system circulating pumps; one is rated at 400 g.p.m. at 150 ft. head and 25 h.p. and the other is rated at 220 g.p.m. at 145 ft. and 15 h.p. The system supply and return piping is 5 in., covered with double standard thickness insulation throughout. Most of the external piping is buried below ground but a short section near the boiler house is exposed above ground. The maximum water velocity in the distribution piping is about 4 feet per second.

The system primarily feeds a series of hot water blast coils in three large warehouses and a diversified series of low pressure steam generators in various scattered smaller buildings and shops. The warehouse heating coils are designed for 380 F water entering and 240 F water leaving with 40 F air entering and 160 F air leaving. Each coil has a capacity to deliver 250,000 Btu per hour. Normal cold weather operation indicates a 420 F boiler temperature with enough return water injection at the pumps to supply water to the system at about 405 F when the system temperature drop is 160 to 180 F. The water temperature in the supply main at a point 3400 ft. from the boiler is approximately 390 to 395 F. Since there is no process load on this system, the supply water temperature is varied manually with weather changes to reduce line heat losses. For instance, on April 24, 1956, equilibrium water temperature readings were observed as follows:

Location	Water Temperature—F. Supply	Return
1. At boiler	420	320
2. First heating coil in first warehouse	375	270
3. First heating coil in third warehouse	370	270

This indicates that a substantial quantity of water is being recirculated and by-passed because of the relatively mild weather of that period.

Chanute Air Force Base

The system installed at Chanute Air Force Base, Illinois, is of special interest in that it illustrates that a conventional steam boiler may be utilized to generate HTHW. The total connected load is 24,000,000 Btu per hour supplied by two type FM Babcock and Wilcox integral steam boilers each with a rated capacity of 18,000 pounds of steam per hour. The boilers produce steam at 100 psig to a cascade expansion drum which allows supply water at 300 F. The water is supplied to an underground 6-inch system designed for a temperature drop of 150 F. There are two circulating pumps each having a capacity of 270 g.p.m. at 175 psig discharge and 88 psig suction pressure. Each pump has a 25 h.p. motor. The disadvantage of this scheme is that it requires the same blow-down and feed water treatment as that of any conventional steam system.

University Systems

In reviewing the specific problem confronting University administrators on the merits of HTHW versus steam, it appears that there are four possible categories of usage that should be considered separately:

1. Space heating only; electric power purchased.
2. Same as 1 except that a minor amount (approximately 2 per cent of process heat is required).
3. Same as 1 except that a major amount (5 per cent or more) of process heat is required.
4. Space heating plus electric power generation.

1. Space heating only: This classification is perhaps best

suited to HTHW since the temperature of the system can be varied with weather changes and without consideration for process load or electric power variation. The piping system can probably be designed within the 125 to 150 psig classification without having to go to higher pressures because of process requirements.

2. Space heating plus minor process load: This classification is similar to the first if the process requirements can be handled by individual high pressure automatically fired boilers in each separate space as required. If such process loads are minor in quantity or very widely separated on the system, it would probably not be economical to increase a HTHW system to the 300 psig class due to increased piping costs and operating costs.
3. Space heating plus major process load: This classification implies that either a 300 psig common piping system be installed for HTHW or two separate sets of piping be installed; i.e., a 125 to 150 psig system for space heating and a 300 psig system for process requirements. The purpose of the dual piping system is to allow control over each type of requirement individually. In fact, even dual boilers might be installed if the loads were to be particularly variable. Of course, basically, the same discussion applies to a steam system and the decision has to be made to install one high pressure steam line, or one high and one low pressure steam line.
4. Space heating plus electric power generation; this classification is perhaps best suited for steam depending upon the ratio of electric power generation to space heating load. It is impossible to generate electric power with a multitude of small generators (installed as needed over the years) as economically as the public utility companies can generate power with their modern, large, efficient steam-electric units. The primary consideration, therefore, is how economically the exhaust steam can be utilized to reduce the overall cost of power. This involves a consideration of summer water heating requirements as well as process loads both summer and winter. There has to be a use for the low pressure exhaust and extraction steam to keep the overall cost of the electric power generation within economic limits. In some instances, the increased use of steam absorption refrigeration for summer air conditioning is becoming quite important. Every system design is different and it is impossible to generalize as to the effect of any single item on the overall results. This particular classification requires a tremendous amount of study and planning before a logical decision can be made.

Conversions

In many cases, due to expansion of facilities or due to obsolescence of present equipment, University administrators are faced with the question of converting to HTHW or continuing with steam. Again, this is not a simple problem that can be easily generalized. All of the considerations enumerated in the four classifications above still apply. In addition, the following points should also be considered:

1. Condition of existing piping. Often, only the condensate return line needs replacement and the existing system capacity can be increased with an increase in pressure. Even if additional capacity is needed and therefore additional lines, the existing lines still represent an important part of the enlarged system.
2. Investment and space required for convertors in each building. Most University buildings must have low temperature radiation heating systems and therefore, would have to convert from HTHW.
3. Investment and space required to convert present boilers to HTHW generators. This implies an expansion tank primarily, although the boiler headers and piping would probably have to be changed also.

SUMMARY

Advantages

A. HTHW:

1. Relatively small pipe sizes for supply mains due to high pumping head and large temperature difference (therefore low volume of flow). This basic advantage is of greatest importance in large area distribution systems.
2. Piping can be laid at any level, and pipe grading is not critical (although generally desirable). This is important in large area distribution systems in that the piping can follow the contour of the ground. This eliminates manholes, drips, traps and valves so necessary in a steam system upon a change in elevation of piping.
3. Very few specialties requiring maintenance such as steam traps and pressure reducing valves.
4. No condensate drip line or condensate pump.
5. Maintenance and operating costs are less (15 to 20%) due primarily to non-corrosion of condensate return line, elimination of flash tanks, steam traps, stop valves and pressure reducing valves and their corresponding steam losses.
6. Control is simple and flexible since the heat distribution is independent of boiler pressure
7. Boiler size may be reduced in many cases due to the thermal storage of the system being able to carry peak loads.
8. Make-up water quantity and treatment is negligible.
9. Can be easily used to generate various steam pressures at the consuming equipment, thereby keeping all steam piping short and steam specialties easily accessible.
10. Can often be used directly in radiant panels, convectors, and coils without traps, receivers, and pumps at each point.

B. STEAM

1. Smaller pipe sizes for return mains.
2. Lower water temperature in return mains.
3. Less heat loss in return mains due to 1 and 2 above.
4. Less pipe insulation required on return mains due to 1 and 2 above.
5. Less heat loss for same pipe size on supply main, due to lower fluid temperature throughout length of supply main for some final temperature at heat transfer equipment.
6. Most commercially available equipment is designed for steam at 125 to 150 psig, and is therefore readily available.

Disadvantages

A. HTHW:

1. In case of a break, leak, or shut down for repair a considerable quantity of water must be wasted.
2. It requires a considerable length of time to heat up and to cool down the system due to its mass.
3. Once the piping system is installed and operating at full capacity of its pumps, the only logical way that the system capacity can be increased is to add additional supply and return piping back to the central plant. With a steam system, an increase in pressure will increase the capacity of the existing distribution lines within the limits of the class of piping installed.
4. The circulating pumps must operate continuously and must be installed in duplicate.
5. Control and isolating valves are more critical than in a steam system and are more expensive and require more maintenance.
6. In order to maintain an average temperature within heat transfer equipment of approximately 300 to 350 F, it is necessary to use supply temperatures of approximately 350 to 400 F which require more expensive pipe, valves, and fittings than a comparable 125 psig steam system.

B. STEAM

1. Traps, drips, pumps, and accessories are required at many positions to accommodate the condensate formed.
2. Pipe grading is quite important and excavation costs are high.
3. Condensate return lines tend to corrode rapidly unless excellent design and maintenance is achieved.
4. Boilers must be sized for full peak load conditions.
5. Make-up water quantity and cost of treatment may be high.

Conclusion

In conclusion may I repeat the sense of my opening remarks which I have attempted to carry throughout this entire discussion?

I am not certain that I have learned the reason why there are such definite sides to this issue. It seems to me that there are so many different problems, conditions, objectives, reasons, and requirements of each installation that must be properly weighed and judged, that it is impossible to generalize in favor of one or the other system. *Many of our existing steam plants are admittedly quite inefficient, either due to poor design or maintenance, or due to cheap and abundant fuel which tends to negate the necessity for good design or maintenance.* On the other hand, our large modern high pressure steam plants are highly efficient in operation and have relatively low maintenance as well as initial cost. Each method has its disadvantages as well as advantages and a separate decision must be made for each installation.

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When one reads the list of wrecks on holiday weekends, one understands what creates the demand for new cars.—*Journeyman Barber.*

ROCK RIVER CHAPTER held its February meeting on the 21st at Plum Hollow. Vice President Ferger introduced Marine Reserve Lt. George Swanson who gave an inspiring talk on the evolution of the submarine, activities and developments during and since World War II.

I hold every man a debtor to his profession; from the which as men of course do seek to receive countenance and profit, so ought they of duty to endeavor themselves by way of amends to be a help and ornament thereunto.

Sir Francis Bacon

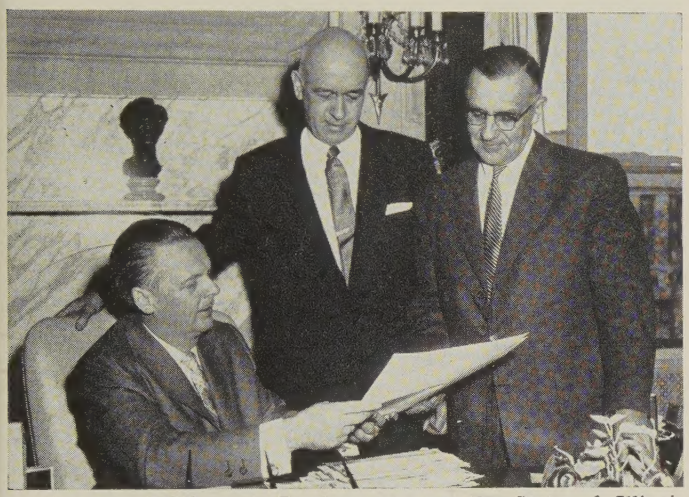
ENGINEERS' WEEK IN ILLINOIS

In General

This year National Engineers' Week was celebrated between February 17 and 23. Nearly every Chapter had some kind of participation and every known means of communication was used.

The story of engineers and their work was told on television and radio, by the use of the excellent picture made by Jam Handy titled "The American Engineer," by engineers talking to lunch clubs, schools and other groups. Several Chapters used full pages in newspapers telling the story with pictures and words.

This year each Chapter in the Illinois Society distributed Engineers' Week Buttons which were worn all during the week. So many people participated in the celebration that time and space do not make it possible to give a detailed account of each Chapter activity.



Governor William G. Stratton presents the State of Illinois Engineers' Week proclamation to Representative Charles K. Willett (S '35, N '38) and Past President C. W. Klassen (S '26, N '46). (Photo by State of Illinois)

Capital Chapter

Capital Chapter's participation besides Springfield TV station was a large dinner at the Elks Club on the 19th where George DeMent, Commissioner of Public Works, City of Chicago, discussed engineering problems.

Champaign County Chapter

On Sunday, February 17 at 2:00 p. m., Station WCIA, channel 3, Champaign, aired a symposium discussion of Engineers' Week. W. J. "Jack" Roberts acted as moderator; President-elect A. W. Neureuther, A. E. Staley Co., Decatur, spoke for engineers in industry; L. K. Crawford of Crawford, Murphy and Tilly, spoke for engineers in private practice; General A. M. Minton, commanding officer of Chanute Air Force Base, spoke for engineers in the armed forces; Dean William L. Everitt, College of Engineering, University of Illinois, discussed engineers in education; and John Bardeen, member of the U. of I. faculty and recent Nobel Prize winner, discussed engineers in research and development.

Joint proclamation of Engineers' Week signed by Urbana Mayor Glen Chapman and Champaign Mayor Virgil Lafferty. Left to right, Mayor Chapman, Urbana City Engineer Mack Kinch, Champaign City Engineer John Kearns and Mayor Lafferty. (Champaign News-Gazette Photo)

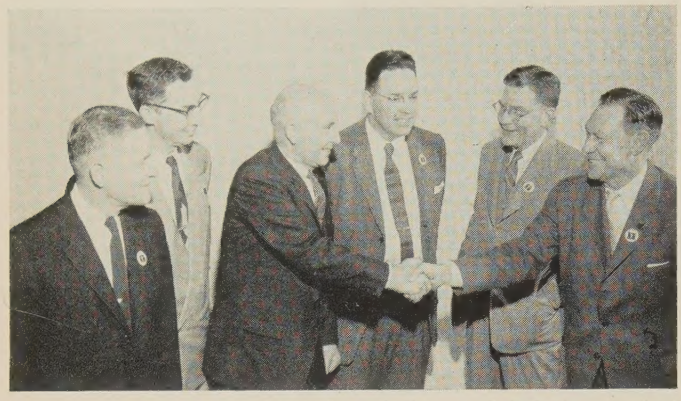
On Thursday, February 21, Champaign County Chapter held its annual dinner dance at Champaign County Country Club. Champaign *News-Gazette*, Champaign-Urbana *Courier*, and the *Daily Illini* all gave good coverage to the various meetings.

Central Illinois Chapter

Central Illinois Chapter began its Engineers' Week participation with a full page of pictures and stories in the Decatur *Sunday Herald and Review*. On Thursday, the 24th, the Chapter had a panel discussion of engineering fees and salaries, consisting of President Royce Johnson, President-elect Neureuther, R. J. Wood, J. R. Gardner, and T. W. Schroeder. The panel was moderated by Gil D. Henning. Television Station WTVP, Channel 17, held a 30-minute panel discussion at 6:00 p. m. on Sunday, February 17, and through the week there were spot announcements and N. S. P. E. film releases. Both local radio stations carried spot announcements and National

Chicago Mayor Richard J. Daley presented the Chicago Engineers' Week proclamation to President John Duba and then received some primary instruction on the use of an engineer's level. Left to right, President John Duba; Dean Harold Gotaas, Northwestern Technological Institute; Dean Ralph Owen, Illinois Institute of Technology; Mayor Daley and Chicago Public Works Commissioner George L. DeMent. (Public Works Department Photo)

Engineers' Week material. In the schools a film titled "Eager Minds" was shown to approximately 4,300 students in Junior and Senior high schools. This film showed the recent scientific and atomic developments and encouraged students to consider careers in engineering and science.



Engineers' Week panel discussion of Fees and Salaries, Central Illinois Chapter. Left to right, J. R. Gardner, T. W. Schroeder, President Royce Johnson, President-elect A. W. Neureuther, R. J. Wood and moderator Gilbert D. Henning. (Pfile Photo)

DuKane Chapter

DuKane Chapter participated with window displays in both Aurora and Elgin, and by showing of the film "The American Engineer." Chapter President Donald S. Magowan, Chief Engineer of the Elgin Division of the Illinois State Highway Department, presided at an Engineers' Week meeting held in Elgin at the Eagles Lodge Club House.

NEWS OF THE CHAPTERS

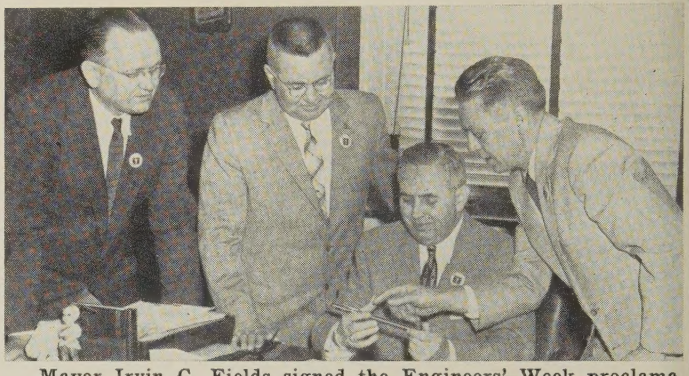
CAPITAL CHAPTER held its Annual Engineers' Week meeting on February 19 at the Elks Club in Springfield. The new chapter officers were formally installed. Reports were heard from Pat Murphy, chairman of the Biennial Legislative Dinner, and Chapter Representatives Kessell and Hudson. Chicago Commissioner of Public Works George L. DeMent gave an excellent talk. The attendance at the meeting was much higher than usual.

CENTRAL ILLINOIS CHAPTER held its February meeting in the Tunnel Room of the St. Nicholas Hotel on the 21st. President Royce Johnson made his official visit and was a member of the panel which discussed fees and salary schedules. A film, "The Eighth Sea," depicted the complete St. Lawrence Seaway project. This film was obtained through the courtesy of Caterpillar Tractor Company.

CHICAGO CHAPTER held its February meeting on the 14th at the Chicago Engineers Club. Ralph M. Hartmann, Manager of Training and Development, Quaker Oats Company, gave a thought-stimulating talk on developing the engineering organization. His talk inspired many questions after his formal remarks had been concluded. President Johnson, Vice President Neureuther and Executive Secretary Roberts were in attendance.

St. Clair Chapter

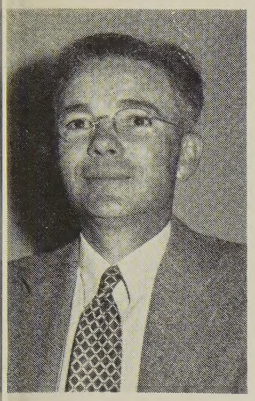
Besides getting East St. Louis Mayor Alvin G. Fields to sign an Engineers' Week proclamation, the St. Clair Chapter officers, President Phil Bauer, Vice President Melvin Dobbs, and Secretary-Treasurer Stanley Petraitis, took it upon themselves to teach Mayor Fields to operate a slide rule. Accompanying picture shows the first lesson. On February 23 the Chapter held its annual professional engineers' recognition dinner honoring Congressman Melvin Price and Charles M. Roos. In numerous other ways the members of the Chapter participated in telling the story of engineering and engineers' work.



Mayor Irvin G. Fields signed the Engineers' Week proclamation for East St. Louis and then studied a few of the intricate operations of a slide rule. Left to right, St. Clair Chapter Secretary Stanley Petraitis, St. Clair Chapter President Phil Bauer, Mayor Fields and St. Clair Chapter Vice President Melvin Dobbs. (East St. Louis Journal Photo)

NEW FOREIGN CORRESPONDENT

Ben F. Muirheid (N '49), who is well known in the Society since he has been serving for the past year as Chapter Representative from Champaign County Chapter and also has been the chairman of the Publicity Committee, left for Washington to take the foreign indoctrination course. Mrs. Muirheid and his three children joined him in Washington on March 7th and are enroute to Kotah, India.



Ben F. Muirheid

The following is a quotation from a letter received by many of Ben's friends:

"The India trip developed slowly over a period of several months. Our first correspondence with the International Cooperation Administration (a branch of the State Department) was back in September. It was not until the end of December that we were sure we would go.

"We have been fortunate in knowing people in India who have supplied us with answers to our many questions. It has given us a fairly good picture of the situation. It will be quite hot in summer. It will be most pleasant and delightful in winter. The Indian people are friendly and hospitable. We will be living in Kotah, in Rajasthan State. Our mail address will be: A. P. O. 74, Box "N," c/o Postmaster, San Francisco, Calif. We will eventually have a residence address in Kotah, but that remains to be arranged.

"We have sufficient inoculations to protect us from everything but homesickness and income taxes! Smallpox, typhoid, tetanus, cholera, typhus and yellow fever. The medical report is that we are a very healthy family.

"Benny, age 14, and Carolyn, age 12, expect to enroll in Woodstock School in June. It is an American mission school operated by the joint efforts of a number of denominations. It is near Mussoorie, India, in the Himalaya Mountains, elevation 7,000 feet, 170 miles northwest of New Delhi. The teachers are largely American and the curriculum is somewhat short on social activities compared to U. S. schools—which can be either good or bad, depending on a person's point of view. Students come from all over Asia. The school is highly regarded and children receive excellent training. It is common for two dozen or so countries to be represented in the student body. They teach all grades from 1 to 12. The school year is from March to November because it is too cold in the Himalayas to maintain school in mid-winter.

"Billy, age 6, will remain at Kotah with Ben and Wilma. His schooling will be in the living room with Wilma as teacher, using the Calvert System. Possibly he will go to Woodstock School the 2nd year . . . by then, he will be getting mighty curious about how Benny and Carolyn live at boarding school.

"Man's Best Friend, Spot, will remain in Champaign. He will be sorely missed by all 5 of us. (Bill has concluded that Spot cannot go because he has not had shots . . . as far as Bill is concerned, this whole business hinges on 12 shots!)"

Ben is no stranger to foreign service. During World War II he was a naval officer during the occupation of Japan and spent many weeks of his World War II service in oriental waters. We join his many friends in the Society and college associates in wishing the Muirheid family "Bon Voyage."

CHAMPAIGN COUNTY CHAPTER held its January meeting at Wheat's Steak House in Urbana on the 10th. After election and installation of officers, the chapter members and guests heard an informal debate on the pros and cons of fluoridation by a leading dentist, Dr. Edward C. Thompson, who spoke for fluoridation of water, versus Mr. Robert P. Pope, an attorney, who spoke against fluoridation. After each argument was presented, a rebuttal was permitted and a spirited question and answer period from members of the chapter was held.

BOOKS

"Building Costs Manual," prepared under the direction of Joint Committee on Building Costs of the Chicago Chapter of the American Institute of Architects and the Appraisers Division of the Chicago Real Estate Board. John Wiley & Sons, Inc., Publishers. 368 pp. $15.00.

This is a large book 8½ x 11 size containing pictures and detailing various building costs by unit costs of square feet and cubic feet and also per cent of total cost. The volume takes up building costs, estimating building costs and depreciation. It discusses cost data, how to cube a building, how to use the Manual and examples of practically every type of building structure now in use from the single-family one-story pre-fab house to office buildings, apartment buildings, warehouses, churches, medical and garages. The dust jacket says:

"The Manual deals with construction costs of 150 different building types and includes introductory material on factors affecting building costs, estimating building costs, depreciation, and regional variations in building costs. It presents over 80 case studies of building type costs with all necessary data and photographs of several examples of each type. It also includes a photographic listing of older type buildings with reference to their modern equivalent to assist the appraiser in estimating the present replacement cost of these older buildings."

For engineers in private practice who have problems of estimating or checking costs or appraisals, this book will be a most welcome addition to your library, not only as a reference book, but as a volume to stimulate ideas.

DU KANE CHAPTER held its January meeting on the 17th at the Elks Club in Aurora with thirty members and guests in attendance. A discussion of DuKane's participation in Engineers' Week was held and the members of the chapter viewed the Jam Handy film, "American Engineer," and then heard a talk on modern packaging in everyday life by Mr. Frank Caldwell of Ferguson-Lander Box Company.

ILLINOIS VALLEY CHAPTER held its January meeting on the 29th in the Ottawa Boat Club with 29 members present. This was the annual business meeting of the chapter and reports were heard from Chapter Representative Frank Dunavan, President Casimir Chamlin and the Nominating Committee. The slate named by the Nominating Committee was elected by unanimous ballot. Mr. Allen Osterling of Portland Cement Association showed three short films on highway and concrete construction.

JOLIET CHAPTER held its February meeting on the 20th at the Candlelight in Joliet. Especially honored were the members of the Joliet Junior College Engineers Club. The chapter members and guests saw three films —"The American Engineer," "Bomb Proof" and "Pipeline Pioneer."

LAKE COUNTY CHAPTER held its January meeting at Hanks Supper Club on the 16th, with 47 members and guests present. Newly elected chapter officers were installed by Sidney Danoff. Mr. Leon Strauss, of the firm of Rothschild and Company, Investment Brokers, presented a panel program entitled "Financial Night." The panel explained the operation of the stock market and the procedure for handling an order for the purchase of stock. The presentation was followed by a lively question and answer session.

ST. CLAIR CHAPTER held its February meeting on the 23rd at the K. of C. Building in East St. Louis. As part of its Engineers' Week participation, the chapter honored Congressman Melvin Price and Charles M. Roos. It was especially fitting that Congressman Price be honored, since he is the sponsor of a bill in Congress which, if it becomes law, will give a $500 award to high school seniors completing an examination in mathematics and an additional $500 to college freshmen upon successful passing of an examination in calculus. Of course, the purpose is to stimulate interest and attract new students in engineering. Professional recognition, consequently has become an annual event in St. Clair Chapter.

WEST CENTRAL CHAPTER held its January meeting on the 16th at the Elks Club at Galesburg. President Toepke formally installed the new chapter officers using the suggested I. S. P. E. installation ceremony. A resolution favoring the merger of the I. A. H. E. and the I. S. P. E. was adopted and it was moved to present it to the Board of Direction at their next meeting. Dr. Willard Ross gave an address on mathematics in industry.